

Sewer/solid waste management

Since most DNR-managed lands in the planning area are designated for commercial forest use there had been no need for sewer or wastewater planning. Solid waste management has been limited to cleanup of unauthorized garbage dumping because there is no residential use of the lands.

No Action Alternative

Natural Environment

EARTH

Approximately 11,390 acres of the 15,707 acres of trust land in the planning area would be available for timber harvesting under the No Action Alternative. In addition, there are approximately 3,098 acres mapped as unstable areas (Watershed Analysis ARSs 1, 2, 3 and 4) where harvesting would be either prohibited or significantly restricted. There would be approximately 1,181 acres of riparian buffer and 38 acres of wind buffer. No large areas have been identified as possibly inaccessible for harvesting under this alternative.

About 62 miles of new road would be constructed during the next 60 years. Approximately 1.7 miles of construction would be on slopes mapped as unstable and one mile on potentially unstable slopes. An average of 89 acres of regeneration harvests, 47 acres of thinning, and 11 acres of partial-cut harvests would occur annually.

Unstable Slopes

Short-term: Direct Impacts – Indirect Impacts

Road construction could destabilize local slopes and result in impacts to stream channels (Sidle et al., 1985; Montgomery, 1994; Wemple et al., 2001). Removal of support from steep, unstable slopes and potentially unstable slopes as a result of road construction could cause small debris slides or debris flows. These failures could block the road, damage the road prism, destabilize slopes above the road cut-banks, or plug drainage structures causing water to be diverted onto the road surface, road fill-slopes, or stream channels. If failed debris enters a steep stream channel, a debris torrent could result. Sediment and debris entrained in debris torrents would likely reach fish habitat and, possibly, public facilities and private structures. The likelihood for the potential impacts described above to occur would be substantially mitigated by adherence to Watershed Analysis Prescriptions. The Prescriptions prohibit road construction on the steeper and most slope stability-sensitive areas, and they specify construction practices designed to prevent slope failures that could significantly impact water quality, fish habitat or public facilities.

No probable significant impacts to slope stability would be expected as a result of implementing the No Action Alternative. Road construction and timber harvesting must comply with Watershed Analysis Prescriptions that were designed to prevent slope failures that could create significant impacts. Additionally, a DNR slope stability specialist will make an on-site evaluation of activities on potentially unstable slopes. Timber harvesting could affect slope stability by influencing root structure and the amount of water that enters the soil (Sidle et al. 1985). The potential effects of these influences on slope stability have been modeled using numerous timber harvest and site condition scenarios (Sidle, 1992; Krogstad, 1995; Schmidt et

al., 2001; Keim and Skaugset, 2003). Tree root structure in stumps declines following timber harvesting and, to the degree that root structure is not replaced by new vegetation, the capacity of roots to hold near-surface soils in place is reduced. Increases in soil-water levels during high intensity rain-on-snow events following harvest of conifer stands can be substantial. The likelihood of rain-on-snow events in the planning area is greatest above elevations of about 1,700 feet. Decreases in root structure and/or increases in soil-water may be significant at a specific site; however, actual slope stability consequences are dependent on site-specific topography, geology, soils, and vegetation conditions. Slope failures – when they occur – can result in sediment delivery to streams and, possibly, debris torrents.

The potential for slope failures triggered by reductions in root strength and/or by increased water input to soils is considered to be low on areas available for harvest under the No Action Alternative. The aerial photo survey completed during the Watershed Analysis process indicated that failures had not occurred on these areas even though timber had been harvested from them at least once previously.

Surface Erosion

Short-term: Direct Impacts – Indirect Impacts

The potential for soil erosion exists when roads and landings are constructed and timber is harvested. Erosion of exposed soils on cut- and fill- slopes during road and landing construction is likely in the short-term (Burroughs and King, 1989). Erosion on these areas can be reduced by rapid revegetation of exposed soils, and the potential for sediment to reach streams is reduced by the diversion of road ditch water onto the forest floor away from stream channels. Erosion can occur on timber harvest areas where soils are disturbed; however, the potential for surface erosion and sediment delivery to streams can be prevented or minimized by utilizing harvest methods and equipment that are appropriate for the site (Chamberlin et al., 1991).

It is standard practice on DNR-managed lands to require erosion control measures on soils exposed during road and landing construction, and to limit harvest methods (timber felling and yarding practices and timing) so as to minimize soil disturbance. For these reasons the potential surface erosion impacts are not expected to be significant.

Unstable Slopes and Surface Erosion

Long-term: Direct Impacts – Indirect Impacts

The likelihood for the potential slope stability and surface erosion impacts described above to occur decreases with time following the activity. The potential effects of road construction and timber harvesting on slope stability – although declining with time – may persist for decades on some sites. Surface erosion on both new roads and harvested areas typically decreases rapidly, but traffic-related road surface erosion can occur over the long-term, especially during wet-weather timber or rock hauling. This potential is mitigated by diverting road ditch water onto the forest floor away from stream channels, and by DNR timber sale contract clauses that prohibit hauling when eroded materials could potentially reach streams.

Unstable Slopes and Surface Erosion

Cumulative Impacts

Potential cumulative impacts would relate to elevated levels of sediment and debris in stream channels and fish habitat. These impacts are not expected to be significant because road

construction and timber harvesting must comply with Forest Practices Rules (including Watershed Analysis Prescriptions), the HCP, and soil protection requirements in DNR Northwest Region's timber sale contracts.

Unstable Slopes and Surface Erosion

Mitigation: Landscape Plan Proposal

Paving roads and armoring road ditches to reduce erosion and sediment transport could further reduce the potential for materials eroded from roads to enter streams. The mileage of new road construction on unstable or potentially unstable slopes could be reduced or eliminated by use of helicopter logging for areas where conventional cable logging systems would require road access.

Unstable Slopes and Surface Erosion

Unavoidable Adverse Impacts

The potential for both natural and land management-related slope failures will continue to exist on unstable and potentially unstable slopes. Road and landing construction could result in some short-term increases in sediment production even if potential impacts were mitigated. Over the long-term, erosion will occur on roads and some sediment may enter streams.

AIR

Climate/Air quality

Potential pollutants from activities proposed under the No Action Alternative could include dust from logging truck traffic on dirt roads. Smoke from wildfires and silvicultural burning may also introduce pollutants, although to date wildfires have been very infrequent and inconsequential in size and little future silvicultural burning is anticipated under this alternative. No activities are proposed under the No Action Alternative that would be anticipated to impact the Air Quality Index rating. At present, the Air Quality Index indicates the Bellingham area is rated as "Good," the healthiest rating. Although air quality in the planning area will continue to be monitored by the Northwest Air Pollution Control Authority no significant adverse impacts are expected.

Short-term: Direct Impacts – Indirect Impacts

Traffic on dirt roads will result in some short-term generation of dust in the immediate area of operation. If wildfires or silvicultural burns do occur, these may also result in short duration, localized smoke plumes.

Direct impacts may include short-term eye and respiratory discomfort from exposure to dust and smoke for individuals working or recreating in the immediate area of operation. Direct impacts may be minimized by avoiding the areas of operation when dust or smoke is likely to be generated, and will continue to be reduced by current DNR practices of abating dust from roads during harvest operations where it has the potential to impact adjacent residences. Smoke emissions will continue to be minimized through application of DNR's Smoke Management Plan, and wildfire response by local fire districts and DNR fire personnel.

The only potential indirect impact identified is the possibility of temporary, localized hazes from dust or smoke. However, the size of operational areas, use of dust suppression methods, and size and infrequency of wildfires or silvicultural burns should preclude the potential for any significant indirect impacts as dust and smoke emissions will be small, isolated, and infrequent, resulting in rapid dissipation of dust and smoke plumes.

Long-term: Direct Impacts – Indirect Impacts

No long-term direct or indirect impacts have been identified or are anticipated. Impacts to the planning area from the release of mercury during wildfires were raised as an issue in response to the PDEIS. A literature search and consultation with air quality specialists revealed that there is very little published work on the emission of mercury from vegetation burning (pers. comm., Wickman 2003). One study conducted by Friedli, et. al. (2001: Mercury in smoke from biomass fires. *Geophysics Research Letter*, 28, 3223-3226) found that nearly 100 percent of mercury stored in fuels was emitted to the atmosphere, 95 percent of it in the form of elemental mercury. The mercury deposited locally is the 5 percent that is emitted as particulate mercury. Friedli's work was conducted under controlled laboratory conditions. Actual wildland fires may potentially emit more particulate mercury (Wickman 2003).

Friedli and his colleagues found that mercury is emitted from burning vegetation. They projected that mercury emitted from forest fires and from all biomass burning is an important global source of mercury in the atmosphere. Very little, if any, silvicultural burning is planned for the Lake Whatcom area under any of the alternatives. Historically the area has experienced very few wildfires. Since significant emissions from wildfires on state lands in the Lake Whatcom watershed are unlikely, it is not likely that wildfires in the area will contribute to mercury levels in Lake Whatcom.

A research project planned to take place over the next three years in the Superior National Forest of Minnesota will measure the mobilization and accumulation of mercury in response to prescribed fire (Kolka, et. al, 2003). The work plan for this study is in DEIS Appendix D.

Cumulative Impacts

No cumulative impacts to air quality have been identified or are anticipated.

Mitigation – Landscape Plan Proposal

No additional mitigation is proposed. Existing rules and regulations relating to control of dust and smoke emissions are considered adequate for preventing and mitigating any potential impacts under this alternative.

Unavoidable adverse impacts

No unavoidable adverse impacts to air quality have been identified or are anticipated.

WATER

Surface Water Quality

The short-term, long-term, cumulative, and unavoidable impacts on surface water quality are described in the PDEIS Alternative 1, 4.2.1.3 (Pages 156-157).

Mitigation – Landscape Plan Proposal

As described in the PDEIS, mitigation relies on Watershed Analysis (DNR, 1997a), the Habitat Conservation Plan (DNR, 1997b), and the Forest Practices Rules (WFPB, 2001) as amended by the Forest and Fish rules. Rather than three separate approaches to mitigation, these are applied in concert so that the strength of one approach can complement the strengths of the others. As pointed out by Collins and Pess (1997), the strength of Watershed Analysis is in identifying and reducing the dominant, direct physical effects of forest practices on stream resources. This allows a focused application of the Forest Practices Rules to locations within the Lake Whatcom planning area where they are needed such as unstable and potentially unstable slopes. Therefore environmental impacts that do not occur within the planning area, but may occur in other regions of the state or North America because of differences in climate, geology, or vegetation, do not have to be considered. At the same time, the HCP procedures provide a long-term strategy for ecosystem management.

Surface Water Quantity

The short-term, long-term, cumulative, and unavoidable impacts on surface water quantity are described in the PDEIS Alternative 1, 4.2.1.3 (Pages 157-158).

Mitigation – Landscape Plan Proposal

Specific thresholds of hydrologic maturity have been prescribed for the Smith Creek and Olsen Creek sub-basins. However, at the proposed rate of regeneration harvest under this alternative the proportion of area in a hydrologic mature condition would not be less than 77 percent if harvest were evenly distributed throughout the planning area. This is much greater than any of the estimated sub-basin thresholds shown in the table under Affected Environment 4.1.1.3.

Ground Water Quality

The impacts on ground water quality are covered by the discussion pertaining to soluble nutrients under surface water quality.

Ground Water Quantity

The impacts on ground water quantity are covered by the discussion on surface water quantity.

Public Water Supply

The impacts on the Lake Whatcom municipal water supply are the same as those discussed under surface water quality. Therefore the mitigating measures for protecting stream water quality will also benefit the water quality of the lake. Because increases in water yield are unavoidable, increases in annual nutrient loading is also unavoidable. However, they will not be great enough to adversely affect water use.

PLANTS AND ANIMALS

Forest Vegetation: Upland, Riparian, Wetland

Upland Vegetation: General Forest Ecology Perspective

Short-term: Direct Impacts – Indirect Impacts

Short-term direct impacts under DNR's current management approach will be related to harvesting, road building and maintenance activities, and could include canopy removal, soil disturbance and resulting vegetation changes at the site of and adjacent to the activity.

Long-term: Direct Impacts – Indirect Impacts

Longer-term impacts will be related to the greater ratio of forest in younger forest development stages and the resulting vegetation response. Please see PDEIS page 159 for further discussion.

Cumulative Impacts

Cumulative impacts will be related to frequency of entry into the stands for harvest, and will be greatest on compactable soils. Appropriate mitigation measures include extension of rotation length and seasonal restrictions to avoid damage to compactable soils. DNR forest managers use seasonal restrictions routinely; for this reason significant adverse impacts would not be expected.

Mitigation – Landscape Plan Proposal

As discussed under the Cumulative Impacts section above, management under the Landscape Plan will incorporate DNR practices already followed, including seasonal harvest restrictions to protect soils and careful planning of multiple entries into stands to reduce the risk of damage.

Unavoidable Adverse Impacts

Unavoidable adverse impacts would be related to roads, which remove forest cover, increase forest edge, and potentially deliver sediment to streams and wetlands. Thresholds for determining the significance of impacts on an ecosystem scale are not currently available. Localized impacts are discussed at greater length in the PDEIS, in many sections.

Riparian and Wetland Vegetation: General Forest Ecology Perspective

Short-term and Long-term Impacts

The most likely short-term and long-term impacts are to small, unidentified wetlands (under .25 acres) and unprotected headwater (Type 5) streams. These include soil, vegetation and hydrological disturbances that could result, in the most extreme case, in permanent disruption of the hydrology. Please refer to PDEIS page 161 for the mechanisms by which such impacts could occur.

Cumulative Impacts

While it is possible that impacts to riparian areas and wetlands could worsen with successive entries, this is unlikely, and in any case would occur only on a local basis.

Additional mitigation measures

Mitigation for impacts to small wetlands and streams is best accomplished through avoidance. When small wetlands are located in the course of timber sale planning, foresters generally clump leave trees around them to avoid impacts to fragile soils, hydrology and vegetation. In many cases it would also be appropriate to clump leave trees along headwater streams.

Unavoidable adverse impacts

Unfortunately, some wetlands are too small to show up on aerial photos, and may escape notice during the timber sale planning process. Impacts to such wetlands could range from temporary

disturbance of vegetation to severe disruption of hydrology resulting in long-term loss of acreage and function.

Forest Health: Insects and Disease

Short-term: Direct Impacts – Indirect Impacts

The Forest Resource Plan directs that DNR incorporate forest health practices into the management of state forest land to bring about net benefit through the reduction or prevention of significant forest resource losses from insects, diseases, animals and other similar threats to trust assets (Policy No. 9: Forest Health). It is expected that forest health issues will be detected and addressed appropriately in harvest activities on managed sites, approximately 150 acres per year. Regeneration harvests will be a substantial portion of the annual management, providing opportunities to rejuvenate low vigor stands and make needed changes in structure and species composition. Intermediate manipulation allows activities to maintain high tree vigor.

Although deferred management under the HCP likely contributes some commercial volume losses due to forest insect and disease activity, in some areas this mortality has a positive benefit in correcting snag and coarse woody debris deficiencies.

Long-term: Direct Impacts – Indirect Impacts

In the long term, if unacceptable epidemics of forest insects or diseases develop, the HCP allows salvage efforts with mitigation strategies to protect conservation goals. (HCP Final EIS, pg 3-12).

Mitigation – Landscape Plan Proposal

In areas where people work, concentrate, or recreate, hazardous trees and snags should be evaluated and monitored. Action should be taken to reduce safety risks.

Rare and Sensitive Plants

See the Affected Environment: Rare and Sensitive Plants section in this DEIS. The only records for rare and sensitive plants in the planning unit are for two populations of the aquatic herb *Lobelia dortmanna*, from the shores of Lake Whatcom in the 1930s and 1960s. All three of the alternatives discussed in this DEIS would tend to slightly reduce nutrient levels in the lake over time by increasing large woody debris in streams, which could act as a sediment barrier. This could potentially be a slight benefit to *L. dortmanna*, if it still inhabits the lake. It is unlikely that forest practices activities conducted through any of the alternatives would have any impact on *L. dortmanna* populations.

Animals

Individual Animal Species

Short- and Long-term Impacts: Direct and Indirect

There are likely short-term, localized adverse impacts to individual animals whenever timber removal occurs. Besides an immediate loss of habitat, there is inevitably disturbance to, or loss of, individual breeding sites (including loss of nests, young, etc.). This is particularly true for animals that breed in trees (i.e., birds, some small mammals), and is expected to occur for all of the alternatives, although to a greater degree under the No Action Alternative, as it represents a higher level of timber harvest than the other two alternatives.

In general, impacts to bald eagles are expected to be negligible under the No Action Alternative, although favorable long-term impacts are possible with an expected increase in complex forest in portions of the landscape. Other human activities that may impact nesting areas and feeding areas (including Lake Whatcom) are more likely to affect bald eagles in the planning area.

Significant adverse impacts (quality, quantity, accessibility) are not expected for the common loon, great blue heron, osprey, purple martin, or Townsend's big-eared bat under the No Action Alternative or the other two alternatives. For further discussion of the species mentioned above, please refer to the PDEIS, pp. 164-165.

For discussion of impacts to several other species of interest, and long-term effects to general wildlife in relation to general habitat trends, see below, under "Habitat Availability."

Species-specific Mitigation

Species-specific mitigation for most of the wildlife species of interest would be accomplished through implementation of the HCP, using procedures in the Forestry Handbook. Some of these procedures incorporate Priority Habitats and Species (PHS) Management Recommendations. Most notable under this alternative would include the development and implementation of Site Management Plans for bald eagle nests. The current procedure for goshawks only addresses mitigation for active nests within designated nesting, roosting, and foraging (NRF) areas for spotted owls (which do not occur within the Lake Whatcom planning area). However, there is the possibility of providing buffers and timing restrictions for active nests detected in the vicinity of management activities, based on past practices.

Habitat Availability (quality, quantity, accessibility)

Short- and Long-term Impacts: Direct & Indirect

The No Action Alternative would result in a relatively rapid reduction of mature hardwood stands on the landscape, which could rapidly decrease habitat for many neotropical migratory birds and other species that are associated with hardwood stands for feeding, breeding, or other life requirements. For more details, please refer to the PDEIS, p. 165.

Other short-term direct impacts of the No Action Alternative would include the removal of forest cover (loss of habitat) in areas of regeneration harvest and road construction, and the creation of barriers to movement and dispersal for some wildlife species (Mader et al. 1990). Short-term indirect effects of harvesting and road construction may include changes in microclimate of nearby stands/habitat, an increase in bird nest parasitism, loss of existing snags, and a potential for increased human disturbance. For more discussion of these possible effects, see the PDEIS, p. 166.

Long-term impacts of the No Action Alternative include a projected shift in age class or seral stage from a mid-seral dominated landscape to one dominated by complex/mature forest, with an eventual increase in the regeneration stage, and a small increase in the "fully functional" seral stage. Over the long-term, the No Action Alternative should also result in an increase in structural components such as snags and downed wood over the landscape. For further discussion, see the PDEIS, p. 168.

A long-term shift toward mature forest stands is common to all of the alternatives, with a more pronounced trend expected under the Preferred Alternative and Alternative 3. This would result in increased within-stand biological diversity (primarily due to vertical diversification that occurs through time). Over a very long time-span (hundreds of years), horizontal diversity (canopy gaps) would increase biological diversity on the landscape level as well (Franklin et al. 2000).

Before this occurs, some reduction in landscape-level diversity may occur on DNR lands in the short-term, as it is believed by some that the highest level of biological diversity is found in landscapes with forests spanning a wide range of ages (expected to represent a variety of structures across the landscape). However, a loss of early-seral stages (and, to a lesser extent, mid-seral stages) on DNR lands would most likely be compensated for by continued short-rotation harvest on private lands within and surrounding the planning area.

Impacts from road construction are addressed in a general manner, utilizing maps depicting potential road networks under each alternative. Under the No Action Alternative, the portions of the planning area that would be most significantly impacted by road construction would include the middle-western, southwestern, and eastern (mid) portions, where there is currently contiguous mature forest with few roads. The eastern (mid) portion would likely be the most significantly altered, as a couple of main roads with spurs are planned in a currently unroaded area. This would introduce “road” and “edge” effect, and would particularly affect interior forest-associated species.

It is important to note that this analysis evaluates overall amounts or percentages of forest cover or habitat types on state lands within the planning area. What this analysis is not capable of evaluating is the potential sizes of particular harvest units, or their specific placement in space and time (i.e., pattern, juxtaposition, and connectivity of habitat types across the landscape), which are important factors affecting many wildlife species. This is because a detailed harvest plan has not been developed for each alternative. However, although it is not possible to evaluate the possible patterns or distribution of habitat and possible consequences in terms of population viabilities of particular species or species groups, a general idea of where harvesting could/could not occur has been determined and is depicted for each alternative in Maps 1-5, Appendix C of the PDEIS.

An analysis of the effects for several species of interest was incorporated within a “life form study,” which addressed changes in habitat conditions for specific guilds or life forms. These species include the olive-sided flycatcher (included in the grouping for Life Form 10), northern goshawk (Life Form 11), pileated woodpecker (Life Form 13), and Vaux’s swift (Life Form 14). For a more complete list of wildlife species, by life form, whose habitat needs were used for assessing probable impacts, see the PDEIS, p. 116.

Under the No Action Alternative, Life Form 8 is expected to experience a decrease in suitable and primary habitat in the short term, but a relatively negligible change over the long term. There is expected to be a short-term decrease in suitable and primary habitat for Life Forms 10 and 11, an increase in 50 years, and only slight changes (primarily decreases) over a longer term (200 years). Very slight short-term and overall long-term increases in suitable and primary habitats are expected for Life Forms 13 and 14. See the PDEIS, pp. 166-167 for numerical projections and further details regarding this analysis.

Cumulative Impacts

Potential cumulative impacts under the No Action Alternative could include the accumulation of roads or road beds, increased human disturbance, increased sediment/soil disturbance or transport, habitat fragmentation, and a decrease in habitat suitability for interior forest-associated species (and a resulting decline in those species) for portions of the landscape.

Mitigation – Landscape Plan Proposal

General mitigation for some of the potential impacts under the No Action Alternative includes gaging roads, implementing an aggressive road abandonment program, retaining snags and legacy trees, protecting special/unique habitats, and providing riparian buffers (per the Forestry Handbook procedures for the HCP). The riparian buffers under this alternative would maintain habitat for a number of wildlife species, particularly those associated with the immediate riparian zone. Buffers on type 4 streams would protect habitat for some amphibians and small mammals, and buffers on Type 1, 2, and 3 streams would provide additional benefits for forest-associated birds (Darveau et al. 1995, Hagar 1999). Habitat for amphibians associated with first-order headwater (generally Type 5) streams would not be protected under the No Action Alternative.

Unavoidable adverse impacts

Unavoidable adverse impacts for the No Action Alternative include habitat fragmentation, the reduced ecological value or habitat suitability of unroaded areas, the unavoidable loss of some existing snags, and the resulting changes in wildlife species utilizing the planning area. It is difficult, with current knowledge, to determine how significant these impacts might be.

Fish

The fish of Lake Whatcom include not only cutthroat trout and kokanee salmon, but also some non-salmonids and other introduced species. DNR assumes the measures for fish habitat protection directed toward cutthroat and kokanee will also provide the necessary habitat protection for other fishes. Riparian ecosystems include the active channel and an adjacent forest corridor on either side of water bodies that provide protection for five principal salmon habitat features. These include water temperature, streambank integrity, sediment load, detrital nutrient load and delivery of large woody debris (LWD). The width of riparian management zones (RMZs) necessary to provide fully for LWD is greater than that to provide for the remaining four salmonid habitat features; therefore it is assumed for this analysis that if a buffer sufficiently provides for protection of LWD processes it also protects all other habitat features.

DNR shares concerns over declining kokanee and cutthroat populations expressed in comments in response to the PDEIS received from WDFW. Some past forestry practices, such as inadequate buffering and poorly maintained logging roads within the Lake Whatcom drainage, have not been sufficiently protective of fish habitats. However, to address these and other forestry related problems, DNR proposes to provide the best protection possible during future forestry activities on state trust lands, as outlined in both the DNR-Lake Whatcom Landscape Plan and the DNR HCP.

Habitat Quality

The No Action Alternative provides some protection from mass wasting by following the Lake Whatcom mass wasting prescriptions. The No Action Alternative provides RMZ protection on

all Type 1, 2, 3 and 4 waters. The RMZ widths under the No Action Alternative are assumed to be adequate to protect habitat features. Wind buffers are also provided along larger fish-bearing streams in areas prone to windthrow. These wind buffers, required by the HCP, are designed to reduce windthrow where wind is a problem, prevent damage to the interior RMZ and help maintain and augment riparian ecosystem function.

No specific protection is provided for Type 5 streams. By definition, most Type 5 waters have seasonal flow, are typically characterized by steep stream gradients, and are at relatively high elevations. A significant percentage of stream miles are Type 5.

The absence of RMZs on Type 5 waters could result in impacts to downstream fish-bearing streams. These impacts may come from sedimentation caused by logging-related streambank and side-slope erosion, water temperature increases caused by canopy removal, reduced LWD and detrital inputs due to the absence of leave trees, greater sensitivity to rain-on-snow events and other flooding with associated sedimentation and destabilization of large woody debris structures. These kinds of habitat losses can lower the overall fish productivity of tributary streams. Some protection is provided to Type 5 waters under the No Action Alternative through unstable slope protection. Logging is avoided along Type 5 waters when they occur on unstable slopes; but minimal protection is given along Type 5 waters when they are on stable slopes since no specific RMZ is required. The DNR HCP acknowledges the need to study how much protection is needed along Type 5 waters, and this is currently under study as part of the agreement with the federal services.

The No Action Alternative implements HCP and Forest Practices rules designed to reduce impacts from logging roads. These address unstable slopes and sediment from hauling and construction.

In Smith Creek, large woody debris will be cut into chunks to reduce debris build-up, to reduce the potential for debris torrents.

The No Action Alternative allows some silvicultural thinning and tree species conversions within RMZs to accelerate recovery of the riparian forest to “older forest conditions.” Silvicultural management within the middle and outer zones of the RMZ should result in long-term growth of large diameter conifer trees within the stream channel, and this will help stabilize stream habitat. In some cases, tree thinnings and tree species conversions can be used to recover “older forest conditions,” which should generate high quality salmon habitat in the long term. Older forests provide large diameter conifer LWD trees, which contribute to structure and stability of productive salmon habitat. During the silvicultural management activities there could be some short-term damage to riparian leave trees, but in the long term the riparian ecosystem should be enhanced. Management activities could result in some short-term negative impacts on water temperature due to canopy removal, some sediment runoff could reach the stream channel, and there could be some reduced detrital and LWD level, but in the long term the health of the riparian ecosystem will benefit.

Active restoration of the aquatic and terrestrial habitats is voluntary under the No Action Alternative; however it can happen when outside funds, or those generated by timber removals, become available.

Short-term and Long-term: Direct Impacts – Indirect Impacts

The No Action Alternative may result in significant adverse impacts to fish habitat due to the lack of riparian management zones on Type 5 waters, as touched on above and in the discussion of the Affected Environment. There is debate over the probability of such impacts, which is one reason for the DNR's HCP-driven study of this issue.

The agreement to cut LWD into “chunks” in Smith Creek was meant to prevent the formation of large logjams that could break free in large floodwaters as large debris torrents. This action is being taken for the safety of downstream residents and resources. It could, at the same time, result in significant short- and long-term salmon habitat loss since removing LWD will reduce the occurrence and complexity of in-channel pools, and would cause long-term stream channel instability. Based on a geomorphologic review of the watershed, such debris flows dynamics are a natural part of streams in this region. The general cycle includes periods of stabilization resulting in pool formation, followed by major washouts, followed by pool formation and re-stabilization.

Cumulative Impacts

Potential adverse cumulative effects on downstream fish habitats from soil compaction (timber harvesting and roads) and reduced hydrologic maturity are addressed under the No Action Alternative. As identified under “water quality,” the impacts of timber harvesting on peak flows in the No Action Alternative are mitigated by the watershed analysis prescriptions (DNR, 1997a). These require maintaining a certain proportion of the timber in the Smith and Olsen Creek watersheds in hydrologic maturity.

The impacts of roads on peak flows are mitigated by the watershed analysis prescriptions and by harvest system planning. These measures tend to keep the active road miles to a minimum at any given time.

Mitigation – Landscape Plan Proposal

Once the study of harvest and Type 5 waters is complete, science-based mitigation measures for potential fish habitat impacts could be designed.

Unavoidable adverse impacts

Whenever logging and road construction occurs in a watershed there will be some increment of change to salmonid habitat quality and quantity. The degree of change will depend on how much consideration is given to maintaining natural watershed processes. Particular attention needs to be paid to maintaining vegetation composition and age characteristics, to keep erosion and runoff processes within the range of natural variability.

Some habitat change is unavoidable, and salmonids living in steep headwater streams can adapt to low levels of habitat loss; but salmonid adaptation to environmental change is vastly reduced when habitat impacts fall outside natural background levels.

Habitat Accessibility

Habitat will be accessible to all native fish species during all life stages, on state trust lands. All fish-blocking culverts will be repaired with fish-passage structures, and replacement will occur

during planned management activities or during implementation of the Road Maintenance and Abandonment Plan.

ENERGY AND NATURAL RESOURCES

Energy Resources (Coal, Oil, Gas, Hydropower)

Coal

DNR, at its discretion, may grant coal option contracts for a term of one year, which then may be converted to a coal mining contract. An option contract, if granted, allows exploration activity including drilling and construction of temporary drill access roads. A coal mining contract allows for further exploration, and development and extraction of coal if sufficient quantity and quality were found. The mining method to be used, that is, surface or underground mining methods, would depend on the economic and physical characteristics of the deposit. Surface mining would have the greatest impacts to habitat, air and water quality. Underground mining would limit the impacts to the underground access points, waste rock storage, mine facilities, access roads and any other infrastructure required. A parcel could potentially have coal extraction without surface disturbance with an underground mine. Groundwater impact could result from underground mining. Any mining proposal would be subject to environmental review, likely leading to an environmental impact statement, and to a number of permits such as state and federal surface mine permits, county conditional use permits, and permits from other agencies such as the Washington State Department of Ecology.

Short-term: Direct Impacts – Indirect Impacts

There are no current coal exploration leases or mining contracts on state trust land within the landscape planning area, and therefore, no short-term direct impacts for coal leasing or mining under the No Action Alternative. While the potential for future coal development within the landscape planning area exists, there currently is little demand for this resource.

There are no indirect impacts of coal exploration and mining, since no leases currently exist on state managed lands where the state controls the mineral rights within the landscape plan area.

Long-term: Direct Impacts – Indirect Impacts

There are no long-term direct impacts from coal leasing, as there are no active coal leases. Future interest in leasing would depend upon an uncertain future demand. There is no agency program for generating coal-leasing activity. Any application for a coal option contract will be addressed on a case-by-case basis. A review of the lease application would be completed to determine if leasing was compatible with land management goals for the area and a decision whether to award an option contract or mining contract would be made on this basis.

Cumulative Impacts

There are no cumulative impacts from coal exploration or mining at this time other than impacts from existing historic underground coal mines on non-state land within the landscape management area. The impacts from these existing workings have not been recognized or understood. There are no currently operating coal mines nor any known coal exploration activity on fee or state land within the landscape management area and therefore, no cumulative impacts.

Coal leasing is discretionary, and any future decision to lease would consider environmental impacts as well as management goals for the parcel in question.

Mitigation – Landscape Plan Proposal

If future coal option contracts were issued, any exploration work would follow guidelines of the HCP, Forest Practices Rules, Forest and Fish regulations, best management practices and other protective measures as determined in the DNR approved plan of operations. A no-surface-entry restriction could be imposed on any leasing, and any extraction of or access to coal resources could be restricted to subsurface only. Any exploration drilling or other activity could be restricted to existing roads, mitigating any new road construction impacts. In the rare instance that a proposal was considered, mitigation specific to the proposal would be a part of environmental review during the permit request process as subject to well as all required state and Federal surface mine reclamation permits, conditional use permits and any other permits and regulations.

Unavoidable Adverse Impacts

Leasing is a discretionary activity and restricting any new leasing would avoid impacts. However, impacts to the surface could occur where the state manages the surface but does not hold the mineral rights, if the holder of the mineral rights wishes to pursue mining activity. The state has little discretion in this activity if it does not control the mineral estate. The state could require payment for surface damage.

Oil and Gas

Short-term: Direct Impacts – Indirect Impacts

There is currently one active oil and gas lease in the Lake Whatcom landscape planning area. This lease has a no surface occupancy provision, prohibiting any surface impact to the lease parcel and therefore eliminating any potential short-term direct impact. Any drilling or other exploration activity must be done from non-trust adjoining parcels. Directional drilling under the state-owned parcels from adjoining parcels is allowed. Indirect impacts may result from drilling activity on adjacent non-trust parcels. There is no drilling activity currently in the landscape planning area.

Long-term: Direct Impacts – Indirect Impacts

The one current lease in part contains a no-surface-entry provision; that is, no surface disturbance of any kind is allowed. Indirect impacts could occur from exploration activity on adjacent fee land parcels, or on state parcels where the state does not control the mineral rights.

Under the current leasing policy, DNR may choose to restrict surface occupancy within the landscape planning management area. Future leasing activity on state land could be limited to non-surface activities only. Exploration activities on adjoining parcels including geophysical surveys could be restricted to use of existing roads on DNR managed land. These activities could have sediment contribution impacts related to road construction for access.

Cumulative Impacts

Leasing for oil and gas may occur on other private parcels within the landscape or on DNR-managed lands where DNR does not control the mineral rights. Exploration activity such as geophysical surveys on these types of land may require forest road construction and

maintenance. This activity may contribute some sediment to local drainage systems. The no-surface-entry requirement on recent leases and on any future leasing will eliminate contributions to cumulative impacts from DNR managed land, where DNR controls the mineral estate.

Mitigation – Landscape Plan Proposal

There is a no-surface-entry provision on the active oil and gas lease, therefore no potential impacts. Not allowing surface entry on any future oil and gas leases would also mitigate potential impacts.

If there are no restrictions on surface activity in future leases, restricting access and activities to existing roads within the watershed will minimize additional road construction impacts.

Unavoidable adverse impacts

One current lease has a restriction on any surface activity and disturbance, so unavoidable impacts are not anticipated. Future leasing would maintain the no surface disturbance policy, and limit unavoidable impacts.

Hydropower

There is no current or potential hydropower resource within the landscape planning area, and, therefore, no likely impacts or necessity for mitigation.

Mineral Resources (Sand, Gravel, Rock, Metals)

Sand, Gravel and Rock

Short-term: Direct Impacts – Indirect Impacts

Direct impacts from sand, gravel and rock pits are minimal. There is currently only one borrow pit on DNR-managed land within the landscape planning area. The potential for commercial gravel sales and operation on state land is very limited. Gravel or rock removal for local use, such as road maintenance or as road base material, is the only likely use for this material. Impacts from the existing borrow pit, which is less than one acre in size, are minimal. Some sediment discharge with stormwater could occur. The small size of the site would limit sediment contribution. Strategies for Objective 2 of the No Action Alternative address forest road maintenance and abandonment issues. Pit development also would follow these guidelines.

Indirect impacts: New borrow pit development and operation could affect sediment load contributions, depending on the number of new pits. The small size of these pits would limit the sediment load contribution. Borrow pits on private land could contribute to the overall sediment load.

Long-term: Direct Impacts – Indirect Impacts

Long-term impacts are similar to the short-term impacts. The limited nature of these resources within the landscape planning area limits the long-term impacts of gravel or rock operations. Any future or long-term development would be small, limited to borrow pits of 0.2 acre in size, and related to road maintenance activity on forest roads. It is difficult to predict the frequency of this type of long-term use. It depends in large part on the amount of timber sales activity in the future.

Cumulative Impacts

Cumulative impacts from gravel or rock activity are limited to non-commercial borrow pit activity. As these types of pits are small, cumulative impacts would depend in part on the number of pits developed in the future. Impacts could include increased sediment load contribution from stormwater run-off. Borrow pits on private land could contribute to the overall sediment load within the landscape management area.

Mitigation – Landscape Plan Proposal

Restricting commercial sales of sand, gravel or rock would mitigate impacts from this activity, although the potential for commercial development is limited. Restricting the number and/or size and location of forest road or other usage borrow pits would mitigate potential impacts. Other mitigation measures would be implemented by following guidelines under the HCP, Forest Practices rules and Forest and Fish rules, best management practices and recommendations of DNR specialists in the location of these activities.

Unavoidable adverse impacts

Some sediment load contribution could occur from road maintenance borrow pits. However, this would be limited as the size and number of pits would be small.

Metallic Minerals

There are no direct or indirect, short or long-term impacts from metallic mineral occurrences as there are no reported economic metallic minerals within the landscape planning area. Metallic minerals are not likely in the given geologic conditions.

Industrial Minerals

Industrial minerals present within the landscape planning area are limited to reported clay mineral occurrences. There is little demand for this material, and there has been no leasing activity. As a result, there are no direct or indirect, short or long-term impacts. Future leasing activity for this material is highly unlikely, limiting any potential long-term direct or indirect impacts within the landscape planning area.

Forest resources (Timber, Special Forest Products)

Timber Resources

The following table summarizes the cumulative impacts of each alternative on the availability of acreage open to commercial harvests, average annual harvests, average harvest volumes per acre, and the annual acreage treated as regeneration, thinning and partial cut harvests.

Table 6, Cumulative Impacts on Timber Harvest

Cumulative impacts of each alternative on the availability of acreage open to commercial harvests, average annual harvests, average harvest volumes per acre and the annual acreage treated as regeneration, thinning and partial cut harvests.

	No Action Alternative	Preferred Alternative	Alternative 3
Acres available for harvest or restoration activities	11,390	8,276	5,475
Percentage of 15,707-acre planning area	73	53	35
Draft average annual harvest volume (thousand board feet/year)	5,511	2,733	492
Draft average Harvest Volume (thousand board feet/acre)	37	30	9
Draft annual acreage treated as regeneration harvests	89	43	0
Draft average annual acreage treated as thinning harvests	47	35	18
Draft annual average acreage treated as partial cut harvests	11	13	11

Note: The numbers in this table are approximate, resulting from modeling analysis, and used for comparative evaluation for planning purposes only. (Source: Road Summary, Stuart, 2003; Comparison of February 02 Sustainable Harvest Model Run, Brodie, 2002.)

Under the No Action Alternative approximately 11,390 acres would be available for commercial timber harvest, roughly 73 percent of the project area.

Short-term: Direct Impacts – Indirect Impacts

Sufficient acreage and volumes would be available to support immediate harvest operations. Because the options for access to stands are greatest under this alternative, it provides more opportunity to select a method of logging.

Long-term: Direct Impacts – Indirect Impacts

The average rotation age would be 60 years under this alternative. The average site index on operable lands would be highest under the No Action Alternative, which would, in turn, support higher yields per acre over the entire planning area. Maintenance of Douglas-fir dominant stands will continue. The availability of red alder of commercial size will decrease over time. Stands with higher levels of hemlock and cedar will increase.

Cumulative Impacts

The cumulative impacts of each alternative are shown in Table 6 above.

Mitigation – Landscape Plan Proposal

Unknown at this time

Unavoidable adverse impacts

Unknown at this time

Special Forest Products

Short-term: Direct Impacts – Indirect Impacts

The No Action Alternative provides the most acreage available for the harvesting of non-commercial products. Vehicular access to sites would be maximized under this alternative.

Long-term: Direct Impacts – Indirect Impacts

Those vegetative products needing open conditions and full sunlight will be most abundant under this alternative. Availability of plants producing wildflower honey would be maximized. Management of plantations for boughs would be a viable option. Fungal species needing maintenance of deeper, undisturbed layers of organic matter found with longer rotations would not be favored by this alternative

Cumulative Impacts

Primary impacts would be financial, in that there may be potential for revenue from special forest products under the No Action Alternative.

Mitigation – Landscape Plan Proposal

Unknown at this time

Unavoidable adverse impacts

Possible conflicts with Native American traditional uses of medicinal plants may impact any commercial harvesting.

Conservation/Preservation (Carbon Sequestration)

See the Comparison of Alternatives and DEIS Appendix D for a more complete discussion of carbon sequestration. Forests sequester carbon by storing carbon in the forest (stems, foliage, litter, roots, soil) and in products produced from the forest; they reduce carbon emissions through biomass conversion to energy uses which displace the use of fossil fuel and through product substitution for fossil-intensive products. Forest carbon is increased through afforestation from non-forest uses of the land. Short-rotation intensive management accelerates the time availability of wood and the amount, decreasing non-wood substitution. The No Action Alternative is the most favorable of the three management alternatives in the Lake Whatcom landscape in terms of aggregate net carbon storage, even though the amount of stored forest carbon may increase under the other two alternatives.

Built Environment

ENVIRONMENTAL HEALTH

Release of Toxics/Hazardous Materials

No significant adverse impacts are likely.

Risk of Explosion/Fires

There is very limited risk of explosions on DNR-managed lands within the Lake Whatcom planning area. No pipelines cross the planning area nor are there any other risk factors.

As discussed in the Affected Environment /Air section, past wildfire history (very few fires, each small in size) and current zoning suggest that there is a relatively low risk of fire threatening homes and other structures adjacent to state trust lands under the No Action Alternative.

Risk of Slides, Floods, Debris Flows

Watershed Analysis Prescriptions were designed to minimize disturbance of slopes during road construction and timber harvesting and to prevent slope failures. Additionally, DNR requires assessment of these areas by a slope stability specialist prior to construction. Roads are located to “fit” the topography and are designed to match slope, soils, rock and drainage characteristics. Potential mitigation measures considered often include use of multiple cut-slope angles, structural support or retention of slopes or the road prism, use of bridges or armored fills for stream crossings, to allow passage of debris torrents, and paving roads and drainage ditches to reduce erosion.

Short-term: Direct Impacts – Indirect Impacts

The potential for short-term impacts to the built environment under the No Action Alternative would be low. There is some risk in the immediate vicinity of forest road construction projects on unstable and potentially unstable slopes. Removal of support from steep, unstable or potentially unstable slopes while constructing roads could result in localized debris slides in soil, and debris slides and block glide in rock. Forest road construction on these areas typically would be spatially remote from elements of the non-forest environment, such as public and private roads and structures, public utilities and other facilities.

Impacts could include damage to the new road prism or road closure, blockage of drainage structures, and increased sedimentation into streams. However, there is a low likelihood that these impacts would occur because road construction on unstable and potentially unstable slopes is constrained by Watershed Analysis Prescriptions that were designed to minimize disturbance of these slopes and to prevent slope failures. Additionally, DNR requires on-site assessment of these areas by a slope stability specialist prior to construction.

Long-term: Direct Impacts – Indirect Impacts

Potential long-term impacts to non-forest elements of the built environment would be damage by debris torrents occurring during periods of intense, prolonged rain-on-snow events. A series of events – local slope failure, unusual climatic conditions, initiation of a debris flow, and delivery of the debris torrent to elements of the built environment – would have to transpire for damage to occur. If damage occurred, it would likely be in the vicinity of stream channels, at road/stream crossings, and on existing alluvial fans. The potential for these impacts to occur is even less than the short-term impacts discussed above.

Cumulative Impacts

The primary cumulative impact to the transportation infrastructure and other structures would be financial, from recurring reconstruction costs. However, these cannot all be attributed to land management activities, particularly damage from debris torrents to downstream structures on alluvial fans. Natural processes in the planning area include slides and flooding, which will occur occasionally regardless of the plan alternative. And it is often not possible to determine whether, or to what extent, a slope failure in a roaded or harvested area was triggered by the activity.

Mitigation – Landscape Plan Proposal

Debris torrent impacts could be reduced in some locations by construction of structures and catch-basins to capture sediment and debris. The suitability of this potential mitigation measure is based on site-specific characteristics at the mouth of each channel, coupled with the hydraulic characteristics of flows occurring within the channel.

Unavoidable adverse impacts

Debris torrents occurred in the incised channels prior to development of the area. Some of the debris torrents were larger than those that have occurred since initiation of timber harvests. Even in the absence of forest management activities, damaging debris torrents will continue to naturally occur in many of the drainages within the planning area. There will be a continuing threat of property damage and injury to people along the channels and on the alluvial fans of these drainages.

LAND & SHORELINE USE

Existing Land Use Plans/Growth Estimates

Land use plans and growth estimates are responsibilities of Whatcom County, its jurisdictions and other state agencies. They are not determined by DNR. The No Action Alternative, as well as the Preferred Alternative and Alternative 3, complies with the uses set for lands already zoned for commercial forestry. No zoning changes are anticipated as a result of this proposal.

Residential and Commercial Development

None of the three alternatives will affect residential or commercial development in the planning area.

Aesthetics

Each of the alternatives includes an objective to “reduce the visual impact of forest management activities as shown on Map S-1 (PDEIS Appendix C).” This analysis primarily considers those areas identified as having “high” and “medium” potential for visual impacts as viewed from six different residential communities.

Riparian, wetland and unstable slope protection will leave an irregular visual pattern at the larger landscape scale. Limiting harvest areas to 100 acres and requiring 300-foot buffers between areas that together would exceed 100 acres will also minimize potential visual effects of management activities.

Softening visual effects in the “high potential” areas east of Cain and Reed lakes and north of Smith Creek will require incorporating site-specific design features in timber sale plans.

Short-term: Direct Impacts

Individual timber harvest activities and some road building will likely affect residential views. The impacts from harvest activities will be short-term, then the forest will re-grow. These site-specific activities are most likely to be visible in the area east of Cain and Reed lakes and north of Smith Creek.

Long-term: Direct Impacts

As new trees grow up in a harvested area another area may be cut, so there always will be visual changes on the horizon. The long-term forest viewshed should improve over time, however, as the HCP's riparian, wetland and unstable slope strategies are implemented. New roads, if visible, would create new, long-term visual impacts. With the information currently available it is difficult to determine how significant this impact would be.

Cumulative Impacts

Cumulative impacts should be minimal because of the dynamic nature of the forest re-growing, harvest size limits and buffers between harvest areas.

Additional Mitigation – Landscape Plan Proposal

Sale design strategies could be added during planning of timber harvests in high visibility areas to soften the visual impacts.

Unavoidable adverse impacts

Since aesthetics are subjective, not objective, it is difficult to say that no one will experience what they consider significant impacts. However, it is DNR's determination that there will be no significant adverse impacts under the No Action Alternative, particularly if mitigation actions are taken into account in scheduling and design of timber sales.

Recreation

All three alternatives are based on a landscape plan objective to "manage dispersed, low impact recreation."

Access throughout the area by recreational users (horse riders, hikers, mountain bikers) will likely remain at current levels because of the size and configuration of the road network over time. There will be some temporary localized closures of user-built trails (such as equestrian trails on Stewart Mountain and the Pacific Northwest Trail on Anderson Mountain) during road construction and timber harvest activities.

Recreational use is expected to be dispersed throughout the forest, and the impact caused by recreational users to streams, wetlands and other public resources is not expected to increase. Because access to the major forest roads system is blocked by gates in cooperation with other major landowners, the need for enforcement, particularly to discourage off-road vehicle use, is not expected to increase.

Short-term and Long-term Impacts: Direct Impacts

Ongoing forest management activities will continue to affect recreational users' experiences, though the extent of the impact will vary with the type of use and is difficult to quantify. For instance, mountain bikers may be less negatively affected by the presence of clearcuts than recreational users who depend on a less impacted natural setting for hiking, nature watching and horseback riding. The quality of hunting is expected to remain the same.

Cumulative Impacts

None identified.

Mitigation – Landscape Plan Proposal

No additional measures identified as needed.

Unavoidable adverse impacts

None identified.

Historic and Cultural Preservation

There have been significant changes in the No-Action Alternative since the PDEIS was finalized because of changes in the internal procedures of the Forest Practices Division of DNR, implementing WAC 222-16-050(5)(k) and WAC 222-20-120, rules and regulations dealing with cultural resource protection. As a result, the potential impacts to cultural resources have changed. These are the procedural steps now being followed:

- 1) The Tribe (or Tribes) notifies DNR of the geographic area or areas for which they wish to receive forest practice applications (FPAs) for review.
- 2) DNR sends electronic notice to the Tribe (or Tribes) of FPAs in those areas.
- 3) Tribe (or Tribes) identifies lands that contain cultural, historic or archaeological resources and contacts DNR.
- 4) This triggers a meeting with the objective of agreeing on a plan for protecting the archaeological or cultural value of the area.

This procedure could function as part of the consultation process under Section 106 of the National Historic Preservation Act. DNR will also continue to use the TRAX system or a GIS cultural resource layer to identify cultural resources recorded with the State Office of Archaeology and Historic Preservation.

In addition, two Northwest Region staff members attended the U.S. Forest Service training for Cultural Resource Technicians during the spring of 2003. Trained cultural resource personnel are available to identify cultural resources in Northwest Region. The Region has indicated it would like to have more people attend this training.

These two changes fill the major gaps in establishing a cultural resource program for the department. As a result of these changes, the Lummi and Nooksack Tribes can meet with DNR on each FPA where cultural sites may be affected to voice their concerns.

These changes increase the level of protection given to cultural resources under the No Action Alternative. This alternative takes a case-by-case approach to dealing with cultural resources. Interviews with staff at the Washington State Office of Archaeology and Historic Preservation indicate there are no demonstrable increased protection differences between case-by-case and programmatic approaches such as the Preferred Alternative.

Unavoidable adverse impacts

Cultural resources that do not occur in either the OAHP or Lummi Nation databases may be impacted by forest practices. This may result from a family or individual's reluctance to disclose cultural use sites. These resources could be impacted in case-by-case analyses or in a more programmatic approach. They may be incidentally protected by increased buffers, but not by any action of DNR related to the alternatives. They are unavoidable impacts under any management scenario.

Agriculture

DNR holdings in the planning area typically are zoned for commercial forestry. The planning area contains no lands specifically designated as agricultural lands under the Whatcom County Comprehensive Plan.

Silviculture

The No Action Alternative supports all silvicultural activities as allowed by federal and state laws, Forest Resource Plan policies, the Habitat Conservation Plan, and other Board of Natural Resources approved policies and management guidelines. All types of silvicultural systems suitable to management of westside forests are also supported. Under this alternative, 11,390 will be available for commercial timber harvest.

Short-term: Direct Impacts – Indirect Impacts

Regeneration of stands will continue to emphasize current practices of artificial regeneration of Douglas-fir and western red cedar. Natural seeding will be used at higher elevations. Aggressive site preparation and competing vegetation control will occur during the first 10 years, including use of herbicides. Current policies concerning snags and green trees can reduce the ability to conduct safe aerial operations particularly if trees are scattered, rather than clumped, across a unit.

Long-term: Direct Impacts – Indirect Impacts

Precommercial thinning will probably be employed on all stands. The access and selection of logging methods allowable under this option will improve the probability that commercial thinning will produce acceptable rates of return.

Cumulative Impacts

The ability to control stand structure, stand composition, and density, control rotation length, facilitate harvesting, and maximize timber yields are optimized under this option.

Mitigation – Landscape Plan Proposal

After a review of each site, the department selects from the following methods for controlling vegetation: no treatment, nonherbicide, ground-applied herbicide, and aerial applied herbicide. A method lower on the list may be used only if it substantially outperforms other methods (Forest Resource Plan Policy # 33).

Unavoidable adverse impacts

Under any type of logging methods, adverse impacts to soil and water quality can occur. All harvest practices can increase the potential for windthrow.

TRANSPORTATION

Transportation Systems (Forest Roads, Trail Systems)

Approximately 62 miles of road would be constructed under the No Action Alternative. Roads would use rock from local rock quarries. The combination of log and rock haul would result in an average of 8 round trips per day generated by forest management activities on DNR forests in the planning area. These truck trips would also contribute to the traffic on other local roads.

Abandonment of roads that are not needed for current management activities would limit the length of the active road network. Some constructed roads access a small area and are not needed once timber harvest is complete. Roughly 41 miles of roads, either existing or yet to be constructed, would serve more than two or three timber sales. These roads could be expected to be permanently maintained as “active,” resulting in a road density of 1.7 miles per square mile.

Short- and Long-term Impacts: Direct and Indirect

Other DEIS sections discuss the potential impacts of roads on mass-wasting, sediment delivery, fish habitat, wildlife habitat, etc. However, DNR’s HCP and the Forest Practices Rules include extensive requirements related to road construction and maintenance in order to mitigate potential impacts; many of the environmental benefits of these new requirements have not had time to play out on the landscape.

DNR’s Habitat Conservation Plan (page IV.62) outlines possible mitigation measures for roads built on unstable slopes, “Roads will be allowed to pass through such areas, but they must be engineered to minimize, to the fullest extent feasible, the risk of mass wasting and be routed through the use of a comprehensive landscape-based road network management process.” These measures involve steps in the planning, design, construction, road use, maintenance, and abandonment of roads on unstable slopes.

Cumulative Impacts

Traffic would contribute to maintenance needs on DNR roads, private forest roads, and public highways, but not at significant levels. Cumulative impacts on the environment are addressed under “Natural Environment” topics earlier in this section.

Mitigation – Landscape Plan Proposal

None identified.

Unavoidable adverse impacts

The use of rock is necessary for building durable roads and reducing surface erosion.

Traffic Hazards/Safety

Any traffic, including that generated by activities on DNR-managed lands, carries with it a potential for safety problems. Risks exist for recreational use of forest roads, however, forest roads in the watershed are closed to unauthorized vehicle traffic.

Short- and Long-term Impacts: Direct and Indirect

Haul traffic is not expected to have significant adverse impacts on traffic or safety. Some localized safety situations could arise, however.

Cumulative Impacts

None identified.

Mitigation – Landscape Plan Proposal

Specific safety plans could be required of contractors when haul routes include public streets, such as time of day of hauling and/or number of loads.

Unavoidable adverse impacts

Activities on DNR-managed lands would increase the traffic levels on forest roads and public streets. The distribution of this increase would vary over time.

Forest Road Maintenance and Abandonment Plans

The Road Maintenance and Abandonment Plan (RMAP) for all forest roads must be completed by 2005, the legal deadline that applies to all forest landowners. DNR plans to complete the RMAP assessment phase within one year of completion of the landscape plan. Orphaned roads must be treated where a clear risk to public safety or potential for resource damage exists and accessing the site will not cause greater resource damage or public risk. All maintenance and abandonment work planned under the RMAP must be completed by 2015. Weather events that occur prior to 2015 could potentially cause damage to existing roads. Potential environmental impacts from roads are covered under "Natural Environment."

Short- and Long-term Impacts: Direct and Indirect

Road maintenance and abandonment work will reduce the risk of environmental damage. This work will cost significant amounts from management funds, but the long-term result may be a more efficient road system and lower maintenance costs.

Cumulative Impacts

None identified.

Mitigation – Landscape Plan Proposal

Maintenance or abandonment work identified by the RMAP could be completed sooner than 2015 to reduce the potential for damage due to problems found in the assessment stage.

Unavoidable adverse impacts

None identified.

Water, Rail and Air Traffic

No rail lines pass through the planning area. Impacts on air traffic would be limited to the use of helicopter logging within the watershed where appropriate.

PUBLIC SERVICES & UTILITIES

Relation to Trust Income

The relationship of trust land ownership to overall ownership within the landscape can be found in the DEIS Introduction. State trust lands in the Lake Whatcom Landscape generate revenues for seven different trusts. The amount of land managed for each trust is shown, along with implied (area-based) beneficiary revenue distribution ratios. These revenue distribution ratios are reproduced in Table 9 below.

Table 9: Area-based revenue distribution ratios used to apportion revenues from Lake Whatcom landscape planning area to the state general fund, trust beneficiaries, junior taxing districts and land management accounts

Beneficiary entity	Revenue distribution ratios	
Whatcom County Forest Board Transfer		
Bellingham & Mt Baker School Districts	15.6 %	
Bonds		5.1 %
Maintenance & operations		10.5 %
Whatcom County roads	7.3 %	
Whatcom County	5.1 %	
Library	1.7 %	
Port of Bellingham	1.3 %	
Whatcom County Conservation Futures	0.2 %	
State General Fund	10.8 %	
DNR Forestry Development Account	11.8 %	
Whatcom County Forest Board Purchased		
Bellingham & Mt Baker School Districts	0.8 %	
Bonds		0.3 %
Maintenance & operations		0.6 %
Whatcom County roads	0.4 %	
Whatcom County	0.3 %	
Library	0.1 %	
Port of Bellingham	0.1 %	
Whatcom County Conservation Futures	0.0 %	
State General Fund	0.6 %	
DNR Forestry Development Account	2.2 %	
Skagit County Forest Board Transfer		
Burlington-Edison School District	1.8 %	
Bonds		0.8 %
Maintenance & operations		0.9 %
Skagit County roads	0.7 %	
Skagit County	0.6 %	
United General Hospital	0.2 %	
Port of Skagit	0.1 %	
Skagit County Medic 1	0.1 %	
Skagit County Conservation Futures	0.0 %	
State General Fund	1.0 %	
DNR Forestry Development Account	1.2 %	
Common School (K-12)		
Common School (K-12)	22.2 %	
DNR Resource Management Cost Account	7.4 %	
Agriculture School (WSU)		
Agriculture School (WSU)	1.2 %	
DNR Resource Management Cost Account	0.0 %	
Capital Buildings		
Capital Buildings	1.4 %	
DNR Resource Management Cost Account	0.5 %	
Scientific School (WSU)		
Scientific School (WSU)	2.7 %	
DNR Resource Management Cost Account	0.9 %	

Notes:

1: Trusts denoted in bold typeface; associated beneficiary groups denoted in regular typeface

2: Totals may not add due to rounding

Total revenues for each management alternative are summarized in Table 7 below, for both the first two decades of the planning period and the entire planning period (200 years). In total, the Preferred Alternative and Alternative 3 produce more than \$160 million and \$308 million less revenue respectively, compared with the No Action Alternative, over the entire planning period.

Table 7: Summary of total undiscounted revenues under alternative management scenarios for the Lake Whatcom landscape planning unit

Alternative	Average annual revenue for first two decades	Total Revenue for first two decades	Total revenue for entire modeled planning period (200 year)	Total revenue for entire modeled planning period: comparison with No Action Alternative
No Action	\$1,786,000	\$35,720,000	\$337,392,000	\$0
Preferred	\$1,572,000	\$31,440,000	\$177,210,000	-\$160,182,000
Alternative 3	\$365,000	\$7,300,000	\$28,908,000	-\$308,484,000

Note: Totals may not add due to rounding

The distributions of average annual harvest revenues for the No Action Alternative are provided in Table 10 below. Each table summarizes average annual revenue receipts for the first two decades and for the entire year planning period by state general fund, trust beneficiary, junior taxing district, and land management fund. The tables also display the estimated reduction in average revenues that each of these entities would face by choice of the Preferred Alternative and Alternative 3 rather than the No Action Alternative. The total average annual harvest revenue for the first two decades for the Preferred Alternative is \$1,572,000/year or the equivalent of the No Action Alternative revenue of \$1,786,000/year less \$215,000/year.

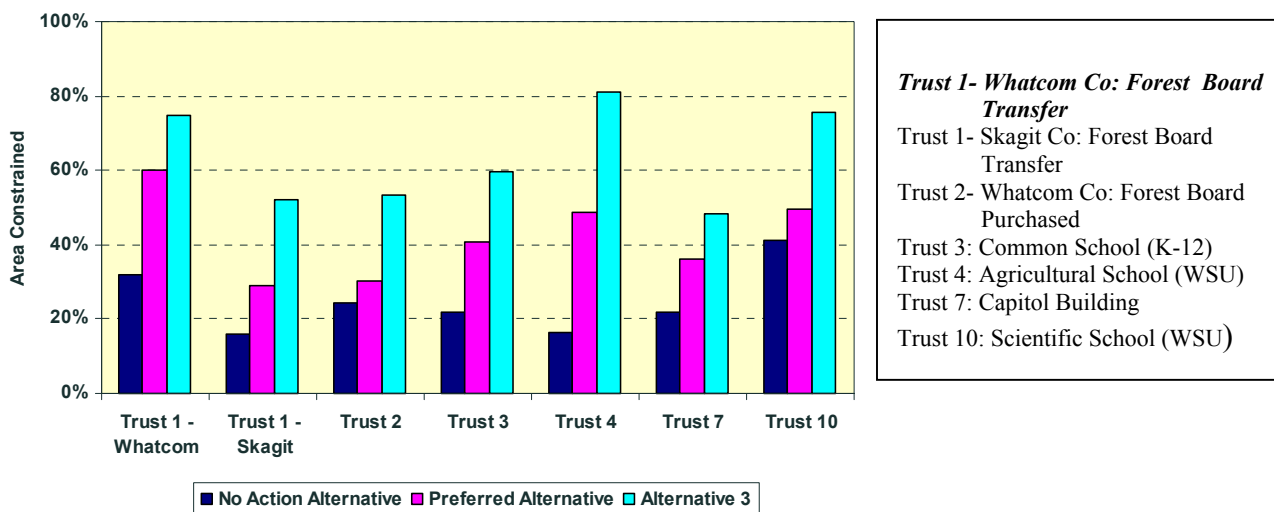
Draft sustainable harvest calculations for Lake Whatcom indicate that the No Action Alternative would return some \$1,786,000 per year for the first two decades of the planning period, and \$1,704,000 per year for the entire planning period.

Table 10: Estimated average annual harvest revenues for the No Action Alternative in the Lake Whatcom landscape planning area, by beneficiary group for the first two decades and the entire modeled planning period (200 years).

Beneficiary entity	First two decades:		Entire planning period	
	Average annual revenue (\$000)	Change in average annual revenue (\$000)	Average annual revenue (\$000)	Change in average annual revenue (\$000)
Whatcom County Forest Board Transfer				
Bellingham & Mt Baker School Districts	279	0	266	0
Bonds	91	0	87	0
Maintenance & operations	187	0	179	0
Whatcom County roads	130	0	124	0
Whatcom County	90	0	86	0
Library	31	0	29	0
Port of Bellingham	24	0	23	0
Whatcom County Conservation Futures	4	0	4	0
State General Fund	192	0	183	0
DNR Forestry Development Account	211	0	202	0
Whatcom County Forest Board Purchased				
Bellingham & Mt Baker School Districts	15	0	14	0
Bonds	5	0	5	0
Maintenance & operations	10	0	9	0
Whatcom County roads	7	0	7	0
Whatcom County	5	0	5	0
Library	2	0	2	0
Port of Bellingham	1	0	1	0
Whatcom County Conservation Futures	0	0	0	0
State General Fund	10	0	10	0
DNR Forestry Development Account	39	0	38	0
Skagit County Forest Board Transfer				
Burlington-Edison School District	31	0	30	0
Bonds	15	0	14	0
Maintenance & operations	16	0	16	0
Skagit County roads	13	0	12	0
Skagit County	10	0	10	0
United General Hospital	3	0	3	0
Port of Skagit	1	0	1	0
Skagit County Medic 1	2	0	1	0
Skagit County Conservation Futures	0	0	0	0
State General Fund	18	0	17	0
DNR Forestry Development Account	22	0	21	0
Common School (K-12)				
Common School (K-12)	396	0	378	0
DNR Resource Management Cost Account	132	0	126	0
Agriculture School (WSU)				
Agriculture School (WSU)	22	0	21	0
DNR Resource Management Cost Account	0	0	0	0
Capital Buildings				
Capital Buildings	24	0	23	0
DNR Resource Management Cost Account	8	0	8	0
Scientific School (WSU)				
Scientific School (WSU)	48	0	45	0
DNR Resource Management Cost Account	16	0	15	0
TOTAL	1,786	0	1,704	0

Notes: 1. Trusts denoted in bold typeface; associated beneficiary groups in regular typeface
2. Totals may not add due to rounding.

Figure 5: Proportion of area on which timber harvest is constrained by management



The No Action Alternative dedicates more than 50 percent of the trust lands' productive capacity for ecological and social benefits (Hulsey, 2002; see PDEIS Appendix D). The percentage of land area for each trust on which timber harvest is constrained under each alternative is shown in Figure 5.

There are several potential revenue sources for the Lake Whatcom landscape, in addition to timber and other traditional revenue sources. These include: (1) green certification; (2) carbon sequestration; (3) land leases; (4) conservation easements; (5) recreation leasing; and (6) exchanging or selling lands. Unfortunately, at present none of these revenue sources are likely to yield revenue streams under any of the three alternatives. Therefore, a comparative financial analysis was completed for carbon sequestration, green certification, and recreation leasing comparing the Preferred Alternative and Alternative 3 against the No Action Alternative. The financial analysis thus estimates what revenues would need to be earned in order to offset reductions in timber harvest revenues relative to the No Action Alternative (Glass, 2003; See DEIS Appendix D), as a basis for then assessing the likelihood of revenues from these sources offsetting reduced timber revenues.

Fire

Short-term: Direct Impacts – Indirect Impacts

The risk of fire is relatively low, based on historic patterns and the access restrictions related to the gated road system. Short-term direct impacts of fire on DNR-managed lands include damage to the forest itself, risk of damage to neighboring properties, loss of habitat and potentially increased risks to water quality. In both the short and long term fires pose potential loss of trust assets in the form of timber and other forest products, and the associated reduction in income potential for federally granted trusts, as well as for counties should Forest Board lands be damaged by fire. Fire damage also could negatively affect aesthetics, both from the standpoint of views and by diminishing the desirability of the Lake Whatcom area for recreational use.

Police

The No Action Alternative has no impact on the law enforcement support provided by the Bellingham Police Department, Whatcom County Sheriff and Skagit County Sheriff.

Schools

Timber harvests from Common School trust lands contribute funding for K-12 school construction. Forest Board contributions to the state general fund also provide support for local educational needs. The No Action Alternative would provide the greatest opportunity for timber management of the three alternatives.

Parks and Recreation Facilities

There are no parks or developed recreation facilities located on DNR trust lands. No direct impacts are expected to facilities located on adjacent public or private lands.

Communications

The No Action Alternative neither impacts communication site leases nor limits new site opportunities. DNR would continue to lease communication tower and building space, increase rental rates as market conditions allow, and seek new customers.

Water and Storm Water Management

The harvest levels proposed for this alternative will not significantly increase peak flows if the harvest pattern is evenly distributed over the planning area. Therefore there are no short-term, long-term, cumulative, or unavoidable impacts to bridges or the water intake for the Brannian Creek fish hatchery from peak flows. Consequently no mitigation measures are needed.

Sewer and Solid Waste Management

Sewer and solid waste management primarily affects residential and commercial areas. State trust lands in the Lake Whatcom planning area are slated for long-term resource use. Most of the DNR-managed property within the planning area has been designated as commercial forestland of long-term significance. Consequently, there is no significant need for or impact to sewer infrastructure under the No Action Alternative or either of the other two alternatives. Solid waste management on DNR-managed lands in the watershed is limited to cleanup of illegal garbage dumping, which is mitigated to some extent by the gated road system.

Preferred Alternative

The Preferred Alternative was developed by DNR and the Committee in a consensus process.

Natural Environment

EARTH

Approximately 8,276 acres of the 15,707 acres of trust land in the Planning Area would be available for timber harvesting under the Preferred Alternative. In addition, there are approximately 3,098 acres mapped as unstable areas (Watershed Analysis ARSs 1, 2, 3, and 4) where harvesting will either be prohibited or significantly restricted. There would be